JOSHUA LEDERBERG

A FREEZE ON MISSILE TESTING

"From a technical standpoint, the most amenable place for controls is testing; a comprehensive freeze on all missile tests would be most easily verified and would provide the utmost assurance against the perpetuation of a costly technology race." Joshua Lederberg is executive head, department of genetics, Stanford University Medical School. He received the Nobel Prize in Medicine and Physiology in 1958 with George W. Beadle and E. L. Tatum. An abridged version of this article appeared in the "Washington Post."

The strategic arms limitations talks (SALT), which will resume in Vienna this spring, have been labeled as the key to world survival through the next decade. Even if we frame the arms race as a by-product of international politics rather than as a living, demoniacal being with independent existence, no one doubts the value of a critical search for practical limitations on the arms spiral.

Arms investment is shaped by dynamic interplay of domestic and international forces, actions and reactions, as much as by negotiated agreements. More than any other process, nevertheless, these explicit agreements require us to examine the assumptions that underlie our strategies of defense and of conciliation.

In my own view the most important function of the arms limitation conferences is their educational value for the participants so that the many internal policy-making forces within each country may better understand the full depth of their national interests, and how these may be pursued in the light of the perceptions of the other nations. It would then be a mistake, as Fred Ikle stressed for other reasons in "How Nations Negotiate," to judge the value of diplomatic negotiations solely in terms of the agreements formally concluded.

Complicated multi-national interests, or more often the confusion of internal debate, may demand the evidence of a formal treaty to affirm a mutually rewarding accommodation. But, at times, the negotiators should be congratulated for refusing a pretense of agreement when such an understanding was beyond the comprehension, the ingenuity, the interests or the power of the parties.

The sentimental idea that agreements should be not only discussed but accepted in a spirit of willingness to compromise national interests will make it more difficult to get countries into active negotiation and exploration of the congruence of their true interests. It leads to such absurdities as refusing to discuss arms control with the USSR after combative actions in Czechoslovakia or the Middle East, as if we would otherwise be granting them a favor contrary to our own interests as part of an arms control package.

A compromise of conflicting national interest may well be a rational goal of negotiation. This is based on the assumption that both parties can find a benefit from a non-zero-sum game, and has nothing to do with amicable sentiment or mutual approbation.

General disarmament, whether unilateral or by treaty, is emphatically not in question. Nothing would throw the world in greater turmoil than to leave its resources to appropriation or hijacking by any pirate with a left-over hand grenade or machine gun. Nor are we politically, socially or economically ready for the peaceful coalescence of sovereignties into the unified world government that must precede the disappearance of national military forces.

To paraphrase the still cogent arguments of the naval strategist A. T. Mahan, the peaceful borders between the United States, Canada and Mexico are quiet just because there is no ambiguity about the distribution of military power. Had we solved the problems of cultural accommodation, as well as economic and political adjustment, among the people of the continent, we could also consider the actual merging of sovereignty and of military power. This is an ideal we must pursue with more realism than piety; but the harsh news of the day points the other way — we may still fail to halt the division of the nations into blacks and whites, Chicanos or French and English. Even a threat of common doom may be insufficient to enforce the dissolution of national sovereignties against the resistance of economic disparities like those between India and the West. Both sides know that every chance of industrial modernization would evaporate if the world's capital were equally diffused and consumed in a population explosion. The "white man's burden" in contemporary terms is to find some way that does work for the effective sharing of capital for the development of the poor countries; if not, we will be relieved of that burden willy-nilly.

Economic Factors

In the eyes of the poor countries, our commitment to the arms race has drained the very resources that might finance international development. Their political pressure (like an implicit threat that India might join the nuclear club) is certainly among the main forces that have dragged the United States and the USSR

to the conference tables in Vienna, Helsinki and Geneva. Were rational calculation at the helm in the policy-making foci of both superpowers, this would have been unnecessary.

Whether the pattern of arms limitation now under negotiation within the SALT framework will result in much savings from arms budgets is problematical. This benefit may be a long-range consequence of the political stability that is the central aim of strategic policy. In the short run, there is more likely to be only a shifting of expenditures to the programs left out of the agreements.

The obvious and in many ways desirable contender here is the naval option. Despite its expense as a launch platform, the submarine has long been advocated as the way to separate the retaliatory force from vulnerable cities, and to provide another resource for assured destruction of an attacker. Missile-launching surface ships, despite their vulnerability, may also be undeservedly neglected as expensive decoys and early warning lines to dilute an enemy's first strike capability. The mix of cheap, vulnerable platforms must, however, be carefully calibrated if it is not to be confused with a force useful only for a first strike. There will be no lack of alternative proposals — some quite plausible — to buy more reliability and to plug potential gaps in systems dedicated to infinite security.

Overkill Potential

Another stated argument for arms control is that the very accumulation of the stockpile, with its vast potential for overkill, makes it more likely that nuclear war will break out. There is a core of rationality to this argument. The technology of nuclear weapons is likely to leak and proliferate in some proportion to the total effort devoted to them. The nonproliferation treaty would have been unnecessary if every nonnuclear country had first had to finance a Manhattan project to learn to make a bomb. Furthermore, the chance of an unauthorized psychotic or accidental firing with its potentially catastrophic consequences is larger the more weapons abound, other things being equal. The superpowers, however, are technically and politically constrained to invest more effort in protective systems for their large stockpiles, and countries like France and China which are still developing their nuclear capabilities probably present more serious threats of significant accident.

As to "overkill," the metaphor makes sense for a first-strike capability — a small percentage of the stockpile of either superpower could wipe out civilization — but a credible deterrent must still be perceived as inflicting intolerable injury after having absorbed a preemptive attack. Overkill potential is exactly what stabilizes the system to make the actual use of a nuclear weapon in anger unlikely.

From this point of view, it is pointless to discuss nuclear parity or sufficiency or superiority in terms of numbers of missiles, which is the fashionable game of the decade. The accuracy of intelligence about the location of missile launch sites, the precision of guidance, the shrewdness of target selection, the security of command and control and, above all, how well these are perceived by an enemy and by ourselves — these now become far more crucial to deterrency than an advertisement of crude numbers of missiles or of warheads. The essential function of strategic arms is to ensure that they will never be used by either side, and that any threat of their use works to stabilize rather than to inflame the relations of competing nations.

The arms race having progressed to an effective stalemate, which has worked better than anyone could have hoped 25 years ago, its main hazards today come from its side effects on both international and national policies. The most serious of these is an unremitting anxiety and suspicion about possible technical breakthroughs that might topple the stalemate. At one level, this leads to the mutual reinforcement of distrust about each side's intentions and plans. At another it provokes the constant search for the technology to do it first here.

The main argument openly leveled by most academic physicists against the ABM is that it simply will not do any of the several jobs for which it is purportedly designed. The real force of their anxiety is that a long-range program of ABM research might eventually develop methods that more credibly offer a prospect of antimissile defense.

Needless to say, it would be comforting to imagine a world in which the defense had a real margin over attack. But how do we get there, except through closely monitored mutual agreements? In the process, the existing balance will be broken, and we will face the most serious risks of either side's feeling compelled to undertake a preemptive attack. At the very least both sides would strive to redouble their offensive weaponry in order to sustain the credibility of their retaliatory potential.

Effective defense against missiles evidently remains quite remote, but it might be technically achieved at the far end of an extensive program of trial and development, of which Safeguard is the first step. This is a technological "Race to Oblivion," the history of which has been authoritatively documented in Herbert York's recent book of that title.

Need For Creativity

Dr. York recounts how the arms race mentality was exploited with great skill and mendacity in the 1960s to fund redundant and useless weapons systems, and to ensure that each of the services in an imperfectly unified defense establishment would be placated. He believes, as I do, that the security of the country depends only in part on technical innovation, and that we must address our greater efforts to stabilizing the security of the world if we are to have any for ourselves. But we cannot overlook the need for technological creativity which will rapidly disappear if we do not repair the sources of the cynicism of our youth about the legitimacy of our national goals. By building so heavily on technological bases of security, while neglecting the causes of internal disaffection, we have impaired our military security far more than any missile deficit would imply.

Dr. York also recounts the overreactions initiated by the United States to the Soviet development of

Sputnik and of their early ICBMs. Perhaps naively, he attributes the Soviet deployment beginning in 1967 of the SS-9 missiles, with their immense 25 megaton warheads, to redressing the boasts of U.S. defense officials about our nuclear superiority. These were made "in order to be able to resist internal pressures for still greater expansion of our offensive forces." Such boasts and generally the two-sided demand for clear superiority over the other in missile counts will add up to little advantage for either. Perhaps they are a psychological necessity for people who sense the threat of mutual annihilation. But they are an irrational response that can do little but worsen the odds.

The Cuban Crisis

Mutual misperceptions of strategic posture undoubtedly fueled the gravest confrontation to date, the Cuban missile crisis in 1962. Dr. York recalls how we grossly overrated the military significance of Sputnik in 1957. The Soviets had, in fact, overbuilt their rockets in a way that suited them for space flight but slowed up their deployment in strategically significant numbers. The missile gap myth of the 1960 election campaign was based on vastly inflated estimates of the Soviet operational capability. This is a difficulty inherent in any intelligence organization, which will never be criticized as much for drawing the most extensive implications out of fragmentary data, as it would be for overlooking any possibility.

Arthur M. Schlesinger, Jr., in his memoirs "A Thousand Days" makes the curious remark that the Soviets in 1960 were "innocent of the higher calculus of deterrence as recently developed in the U.S." Therefore, they could not comprehend the stabilizing purpose of President Kennedy's plans to enhance U.S. missilery. Knowing the actual strength of their own forces they may in fact have viewed Kennedy's missile program in the same way that Secretary Laird construes the SS-9s, namely the development of a first strike potential that could smother the ability to retaliate.

"Too bad, that's their problem!," some might say. But that confusion may explain Khrushchev's Cuban gambit, a desperate move that would have been senseless as a direct strategic threat against the United States — provided the Soviet really had an ample long-range missile force based on their own soil.

When your opponent has nuclear weapons, his jitters are your problem too. (The interpretation of the 1962 Cuban missile crisis is borne out by Roger Hilsman's account of its background in "To Move a Nation.")

The Cuban gambit had to be resisted for its potential side-effects on Latin-American politics, more than as an element in strategic deterrency. It does suggest one avenue that might be opened up for a negotiated program of low-cost mutual security.

In 1961, the late Leo Szilard wrote a fictional parable, "The Mined Cities" (**Bulletin,** December 1961), wherein the superpowers had exchanged the capability of assured destruction by allowing the major cities to be mined by the other side. The idea has been revived from time to time — but like Rep. Craig Hosmer's suggestion that we multiply world security by giving every country four A-bombs — it does an ingenious metaphor the worst injustice to take it too literally. The parable does point out that our cities are hostages to one another, whether the bombs are underground, or need to be delivered by a 30-minute rocket flight. (This reasoning also makes one question whether Moscow and Washington are the right cities to be shielded with ABM, when the potentates would make the most credible hostages.) Why not then agree that the problem of mutual security has some technical solution, achievable at the lowest mutual cost.

The establishment of a Soviet missile base in Cuba, or American bombers in Libya entailed political complications almost as unacceptable as giving extraterritorial access into the U.S. capitol to a Soviet bomb squad. And where would we fit the French and the Chinese?

The nondeployment of a potential ABM system is a constructive equivalent to cheapening the hostage system, with the fewest side effects. MIRVs (multiple independently targeted reentry vehicles) complicate the deterrence equations, giving the first-striker a better chance to destroy a deterrent, but the naval option and a multiplication of feints are as plausible answers as any forseeable ABM. As far as arms control is concerned, once the potential for MIRV was understood little room was left for any verifiable control over its further development. Indeed, the need to play out this act so that both sides could work out the implications of MIRV may have compelled the postponement of SALT until now.

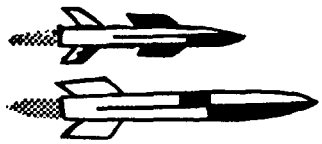
If we separate the gimmickery from the parable behind "The Mined Cities," we can see that the naval options may give us the greatest room for mutual advantage. Ironical schemes can be composed that point up some of the absurdities of the world system. For example, it would be more to our advantage if Soviet submarines refueled at Portland, Maine, than at Cienfuegos, Cuba; and we might offer to exchange base privileges on U.S. shores for their equivalent on the Black and Baltic Seas. But even if such superrational exchanges could be negotiated, they would raise untold mischief through disputes over the interpretation of the guaranteed free access on which they would have to be based. Better that we work out a de facto equilibrium, provided that this is based on the clear understanding that any solution must provide for a zone of strategic security on both sides, or nothing but desperate maneuvering can follow.

Surprise Attack

The greatest anxiety about surprise attack in the next decade — for both sides are in fact expanding the naval option — is that new technology may impair the invulnerability of the submarine. It is absolutely inconceivable that antisubmarine detection and warfare could reach the point of reliably removing the bulk of a retaliatory force in a single surprise attack, without having first been widely exercised and tested. Mutually advantageous agreements to limit such testing should be fairly amenable to verification. They could

(Continued on page 43)

 (Continued from page 6)



be a logical extension of the existing ban on testing nuclear weapons under water.

There is also a danger that units of naval strategic force may become involved in tactical conflicts, with a consequent erosion of the line that marks nuclear weapons off from all others. This will require very careful attention to our own doctrine.

The problem of surprise attack can be formulated in more precise, quantitative terms than any other aspect of defense strategy. There are still many uncertainties, for example the operational reliability of immense computer programs, and the level of nuclear retaliation that would be so "unacceptable" to a potential attacker as to deter him. Nevertheless, the analyst can make a fairly simple model of the array of forces, and ignore the complexities of mass psychology and serpentine recalculation that blur the scientific predictability of any political confrontation. The simplicity of the problem to the rational analyst, and its appeal to the paranoia of the antirational, have captured our attention and resources out of proportion to the role of surprise attack in world conflict. By over-designing our solutions to that problem, we leave ourselves ever less prepared to cope with the actual difficulties of today's world.

The nuclear deterrent can play no direct role in dealing with the Soviet penetration of Africa, harassment by air pirates or the reenslavement of Czechoslovakia. These have no easy answers, but they clearly require the rebuilding of a sense of community with our allies and friends, who are inevitably isolated by a historic trend of unilateral force commitments and defense investments typified by Vietnam and by the ABM.

Freeze Proposed

All sides are approaching the conclusion that mutual defense against surprise attack needlessly consumes an inordinate portion of world resources. We seek a new pattern of reciprocal arms disposal whose very momentum would be the best assurance that it was not merely a gambit for strategic advantage. This would be hard to construct, merely against the fears, angers and entrenched interests of important elements within both superpowers.

A simple moratorium on the emplacement of strategic weapons has been suggested, but it is likely to be entangled in contentious differences over whether it should embrace aircraft, tactical missiles and so on.

From a technical standpoint, the most amenable place for controls is testing; a comprehensive freeze on all missile tests would be most easily verified and would provide the utmost assurance against the perpetuation of a costly technology race. It would complicate some peaceful applications of space technology. However, none of these require precise reentry after a brief, high velocity flight. Furthermore, nothing would be lost in requiring a definite pattern of international participation in space missions to assure that these were a net benefit to the whole earth from which they have embarked.